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INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION
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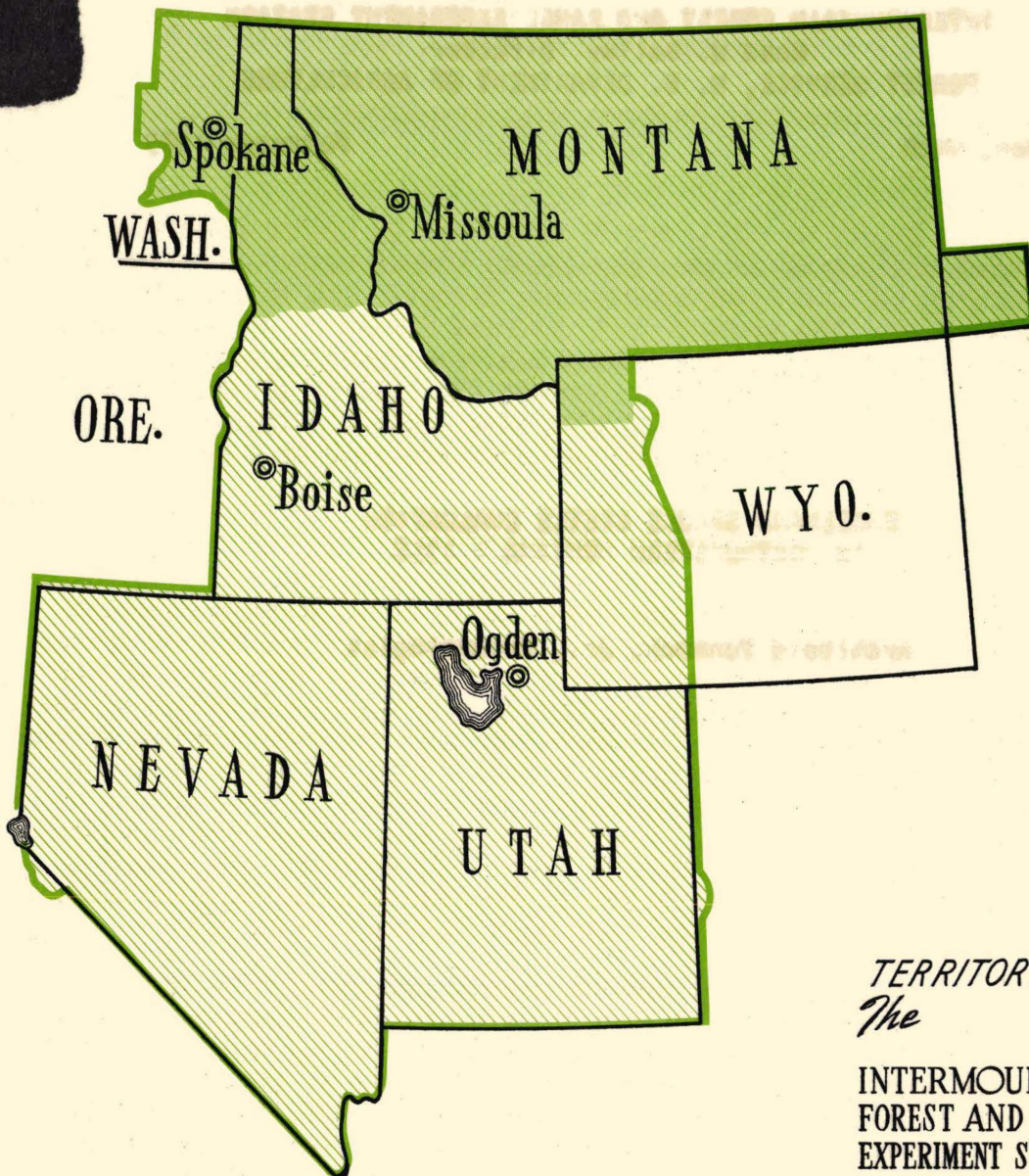
ENGELMANN SPRUCE BEETLE EVALUATION
IN NORTHWESTERN MONTANA - 1958

Archibald Tunnock, Jr., Entomologist

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Prepared by The
Missoula Forest Insect Laboratory
Missoula, Montana

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The MISSOULA FOREST INSECT LABORATORY is a field unit of the Intermountain Forest and Range Experiment Station at Ogden, Utah. The Laboratory conducts forest insect research, surveys forest insect outbreaks, and gives technical advice on cooperative insect control programs in Montana, northwestern South Dakota, northwestern Wyoming, northern Idaho, and northeastern Washington.

The functions are conducted in the remaining station territory by staff entomologists at Ogden, and Boise, Idaho.

ENGELMANN SPRUCE BEETLE EVALUATION IN NORTHWESTERN MONTANA - 1958

Archibald Tunnock, Jr., Entomologist

During the summer of 1958, the Missoula Forest Insect Laboratory evaluated the status of some persistent spruce beetle infestations on the Kootenai and Flathead National Forests, and in Glacier National Park. The studies were directed mainly in drainages that are periodically logged for recent beetle-infested spruce trees. Logged areas were evaluated to measure the results of logging as a means of control. An unlogged site with similar infestation characteristics in Glacier National Park was used as a check.

HISTORY OF THE EPIDEMIC

In the fall of 1949, hurricane-force winds swept through northern Idaho and northwestern Montana. Large volumes of windthrown spruce resulted from this storm and a severe epidemic of Engelmann spruce beetle (Dendroctonus engelmanni Hopk.) developed in portions of this downed timber during 1950 and 1951. By 1952 the outbreak had spread from the windfalls into standing spruce timber throughout most of the spruce type in the above areas. As a result of this storm, approximately 2.5 billion board feet of spruce timber was attacked by this beetle from 1952 through 1956. The outbreak has steadily declined since 1953, when it was at its highest, and in many forest compartments no infestations have been reported since 1956.

Localized outbreaks ("hot spots") continue to persist in some logging areas where a fair residual volume of spruce type remains. The Laboratory in 1957 made surveys to determine the seriousness and the possible cause of these outbreaks. The results of these surveys indicated that several factors probably contributed to the maintenance of the spruce beetle population: greatest losses seemed to occur in stands where an attempt was made to remove only beetle-infested trees, many of which still had green needles, for control purposes. In such areas green spruce stumps, green tops, and injured trees provided a source for spruce beetle development. The same problem existed around the margins of some clearcut blocks.^{1/}

^{1/} Terrell, T. T. 1957. Engelmann spruce beetle activity in the northern Rocky Mountain region. Unpublished report of the Missoula Forest Insect Laboratory, Intermountain Forest and Range Experiment Station, Forest Service, U. S. D. A., Missoula, Montana.

METHODS

Meandering half-chain-wide strips were used to study residual spruce trees growing along and on the slopes of drainages. All unattacked and currently attacked spruce trees above 9 inches in diameter at breast height were recorded by units of 100 trees along each strip. Separate counts were kept of the partially attacked trees, fully attacked trees, and trees that had pitched out and successfully repelled the beetle's attacks.

The spruce type was divided into blocks in the Pinkham Creek drainage on the Kootenai National Forest. The division was adopted during the 1957 survey to determine the variability of the infestation between different parts of the drainage. This procedure was again used in the 1958 survey of Pinkham Creek.

RESULTS

The results of the 1958 biological evaluation for Engelmann spruce beetles within northwestern Montana is summarized in table 1. The percentage of spruce trees infested in 1958 ranged from 0.1 percent in Akinkoka Creek to 9.8 percent in Winkum Creek. In general, the infestation of Engelmann spruce beetles has dropped appreciably since 1957 throughout northwestern Montana. The only increase of spruce beetle attacks in areas surveyed both in 1957 and 1958 (table 2) occurred within Block E (Pinkham Creek) and along Davis Creek. The amount of spruce trees infested in Red Top Creek decreased from 8.8 percent in 1956 to 1.2 percent during 1958.

DISCUSSION

Logging has probably been the most important factor in reducing these localized outbreaks. But, when a comparison of the logged areas is made with the unlogged check site, results show that: only 8 out of the 23 logged units surveyed had lower stand infestation percentages than the check. McDonald Creek in Glacier National Park may have been a poor choice for the check. During the height of the epidemic, most of the pure spruce type was killed in McDonald Creek. Now, the spruce is well mixed with other conifers. A mixed stand would account for a lower infestation percentage in McDonald Creek than in those drainages where control is influenced by pure residual spruce stands. Also, cutting and removal of infested spruce trees was not begun at the same time in all areas surveyed. Access roads have just been constructed during the past year along some creeks. In this latter case, the spruce beetle infestation may have been at its height before control measures were applied.

Persistent logging of infested spruce trees, as roads penetrate "hot spots", may further reduce the high level of infestation occurring in some drainages. More efficient control may be attained if, wherever possible, logging debris from clear-cut infested spruce stands is exposed to the sun. Minimizing damage to residual spruce timber will help keep the beetle population down by creating fewer attractive hosts.

Table 1.--Percentage of residual spruce stand infested by Engelmann spruce beetle in drainages evaluated on the Kootenai and Flathead National Forests and in Glacier National Park - 1958

Drainage	Engelmann spruce trees sampled					Percentage of trees infested
	Number of uninfested trees	Number of trees with pitched-out attacks	Number of beetle-infested trees		Total	
			Partially attacked	Completely attacked		
REXFORD DISTRICT						
Pinkham Creek						
Block A	4,320	21	20	39	4,400	1.3
Block B	3,669	14	9	8	3,700	.4
Block C	1,685	5	6	4	1,700	.6
Block D	3,141	6	14	9	3,170	.7
Block E	3,063	5	19	13	3,100	1.0
Total	15,878	51	68	73	16,070	
Average						.9
FORTINE DISTRICT						
Sunday Creek	2,474	9	3	14	2,500	.7
Weasel Creek	1,076	1	13	10	1,100	2.1
Wigwam Creek	2,767	7	29	97	2,900	4.3
Clarence Creek	2,216	6	49	29	2,300	3.4
Foundation Creek	1,287	8	32	73	1,400	7.5
Total	9,820	31	126	223	10,200	
Average						3.4
YAAK DISTRICT						
Caribou Creek	288	1	9	2	300	3.7
Red Mountain	589	1	7	3	600	1.7
Red Top Creek	1,280	4	15	1	1,300	1.2
Winkum Creek	436	15	24	25	500	9.8
Davis Creek	586	1	12	1	600	2.2
Cyclone Creek	198	0	2	0	200	1.0
Total	3,377	22	69	32	3,500	
Average						2.9

Table 1.--Percentage of residual spruce stand infested by Engelmann spruce beetle in drainages evaluated on the Kootenai and Flathead National Forests and in Glacier National Park - 1958 (continued)

Drainage	Engelmann spruce trees sampled					Percentage of trees infested
	Number of uninfested trees	Number of trees with pitched-out attacks	Number of beetle-infested trees		Total	
			Partially attacked	Completely attacked		
<u>GLACIER VIEW DISTRICT</u>						
Shorty Creek	1,593	2	4	1	1,600	.3
Red Meadow Creek	1,264	3	25	8	1,300	2.5
Mathias Creek	1,394	0	5	1	1,400	.4
Kletomus Creek	965	9	11	15	1,000	2.6
Akinkoka Creek	1,498	0	2	0	1,500	.1
Total	6,714	14	47	25	6,800	
Average						1.1
<u>HUNGRY HORSE DISTRICT</u>						
Sullivan Creek	1,558	6	29	7	1,600	2.2
Doris Creek	696	1	3	0	700	.4
Total	2,254	7	32	7	2,300	
Average						1.7
<u>GLACIER NATIONAL PARK</u>						
McDonald Creek	1,972	7	14	7	2,000	1.0

Table 2.--Infestation trends of the Engelmann spruce beetle from 1957 to 1958 along some drainages in the Kootenai National Forest

Engelmann spruce trees sampled							
Drainage	Number of uninfested trees		Number of beetle-infested trees		Percentage of trees infested		Percentage of increase or decrease in infestation in 1958 over 1957
	1957	1958	1957	1958	1957	1958	
PINKHAM CREEK							
Block A	2,591	4,341	266	59	9.3	1.3	-85.0
Block B	1,720	3,683	130	17	7.0	.4	-94.2
Block C	530	1,690	63	10	10.6	.6	-94.3
Block D	1,666	3,147	85	23	5.1	.7	-86.3
Block E	1,063	3,068	6	32	.6	1.0	+40.0
Total	7,570	15,929	550	141			
Average					6.0	.9	-85.0
CARIBOU CREEK	434	289	38	11	8.0	3.7	-53.7
DAVIS CREEK	2,135	587	10	13	.4	2.2	+81.8
RED TOP CREEK	528	1,284	38	16	6.7	1.2*	-82.0

* 8.8 percent in 1956